

Work Order ID **55299**

January 13, 2010 9:16:58 AM

Page 1

Item ID: D350-748-141TRN

Accept

Setup Start

Revision ID:

Stop

Item Name: Crosstube Turning Detail

Start Date: 1/13/10 Start Qty: 1.00

Cust Item ID:

Required Date: 1/20/10 Req'd Qty: 1.00

Customer:

Reference:

Approvals:

Process Plan: *PT*Date: *10-1-13*

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run Start

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run HoursDraw  
NumberDraw  
Rev.Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

Draw Nbr

Revision Nbr

D350-748-141

Rev E

100

0.00



MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends as per Folio FA648  
2-Turn first side as per Folio FA648  
3- File transition lines smooth.

*Q.A. 10 - 02 - 020*

110

0.00



QC1- Inspect dimensions to dimension sheet

QC

Memo

0.00

Quality Control

*Q.A. 10 - 02 - 020*

120

0.00



MORI SEIKI CNC LATHE LARGE

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA648  
2- File transition lines smooth.  
3-Scribe Part & Batch as per Dwg D350-748-141

*Q.A. 10 - 02 - 020*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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**NOTE:** Date & initial all entries

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Page 2

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Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Stop



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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130

QC1- Inspect dimensions to dimension sheet

0.00



QC

Memo

0.00

Quality Control

0.11 10 - 02 - 02 0

140

QC8- Inspect parts - second check

0.00



QC

Memo

0.00

Quality Control

1 - - AWM 10-2-10

150

Large Fab

0.00



Large Fab

Memo

0.00

Large Fab

Grind machining marks

1 - - AWM 10-2-17

W/O:		WORK ORDER CHANGES					
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Page 3

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Stop



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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160

Outsource process - Heat Treat

0.00



Outsource!

Memo

0.00

Outsource process - Heat Treat

Issue P/O: 11869  
Heat Treat to min 180 KSI As per Dwg D350-748-141  
(MIL-T-6736 OR AMS 2759-1C)  
Sand Blast tube after Heat Treat  
Possible Supplier: Vac Aero  
Ensure Certificate of Conformity is attached

CL 10/5/11 (1)

170

Receive &amp; Inspect for Damage &amp; Mat'l Certs

0.00



Packaging

Memo

0.00

Packaging

Ensure certificate of conformaty is attached

P. 11/4/26 (1)

180

QC6- Inspect dimensions to drawing

0.00



QC

Memo

0.00

Quality Control

S. 10/5/23(1)

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Page 4

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Stop



QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
190	Packaging	0.00							
Packaging	Memo	0.00							
Packaging	Identify and stock in kanban rack								
	Location: <i>x-tube</i>								
200	QC21- Final Inspection - Work Order Release	0.00							
QC	Memo	0.00							
Quality Control									

*DP**10-5-27**①**10/05/28**MF**10-5-27*

W/O:		WORK ORDER CHANGES					
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**NOTE:** Date & initial all entries



# : Picklist Print

January 13, 2010 9:17:02 AM

Page 1

Work Order ID: 55299



Parent Item: D350-748-141TRN



Parent Item Name: Crosstube Turning Detail

Start Date: 1/13/10

Required Date: 1/20/10

Comments: IPP Rev:A New Issue 08-03-06 DD verified by:ec  
 IPP Rev B Removed polish 08.04.02 EC verified by : DD  
 IPP Rev C Remove LPS-3 08.06.23 EC verified by DD

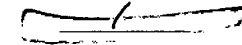
Start Qty: 1.00

Required Qty: 1.00

Component Item ID/	Replacement	Mfg/	Bin	Primary	Last	Route	Unit of	Qty on	Remaining	Qty	Date	Status
D6017-115		Manufactured	No			110	Each	34.0000	1.0000			
Crosstube Material												

*P.M. 10-02-02 @*

Warehouse	Loc Qty	Loc Code
Location		
Main Warehouse		
LG	34	
32912	34	



W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b>	55299
<b>Description:</b> Crosstube Assembly (AS350/355 High Fwd)		<b>Part Number:</b>	D350-748-141
<b>Inspection Dwg:</b> D350-748-141 Rev: D		<b>Page 1 of 1</b>	

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article
 ☐ Prototype

	Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.241	/			
	2.180	+0.005/-0.000	2.182	/			
	2.180	+0.005/-0.000	2.183	/			
	2.237	+0.005/-0.000	2.240	/			
	2.272	+0.005/-0.000	2.276	/			
	2.306	+0.005/-0.000	2.310	/			
	2.339	+0.005/-0.000	2.339	/			
	2.339	+0.005/-0.000	2.339	/			
	0.062	+/-0.010	0.062	/			
	4.26	+/-0.030	4.278	/			
	R0.063	+/-0.010	R0.063	/			
	R0.50	+/-0.030	R0.500	/			
SIDE B	2.240	+0.005/-0.000	2.241	/			
	2.180	+0.005/-0.000	2.182	/			
	2.180	+0.005/-0.000	2.183	/			
	2.237	+0.005/-0.000	2.240	/			
	2.272	+0.005/-0.000	2.276	/			
	2.306	+0.005/-0.000	2.310	/			
	2.339	+0.005/-0.000	2.339	/			
	2.339	+0.005/-0.000	2.339	/			
	0.062	+/-0.010	0.062	/			
	4.26	+/-0.030	4.278	/			
	R0.063	+/-0.010	R0.063	/			
	R0.50	+/-0.030	R0.500	/			
	110.27	+/-0.060	110.270	/			

<b>Measured by:</b>	a. M	<b>Audited by:</b>	AJM	<b>Prototype Approval:</b>	N/A
<b>Date:</b>	10-02-02	<b>Date:</b>	10-2-02	<b>Date:</b>	N/A

Rev	Date	Change	Revised by	Approved
A	06.11.09	New Issue (P/O D350-748-101)	KJ/JLM	
B	07.10.24	Dwg Rev updated	KJ/EC/DD	

W/O:		WORK ORDER CHANGES					
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**NOTE:** Date & initial all entries

Item	Qty	Part Number	Description
	-141		
1	X	D350-748-141	CROSSTUBE ASSEMBLY (AS 350/355 HI FWD)
2	1	D6017-115	CROSSTUBE
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

# **GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6017-115  
FINISHED LENGTH = 110.270±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D350-748-141" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 30.45 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.  
NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT

WITHOUT NOTICE  
WORK ORDER

NO. 55299

BM-0-1-13

**RELEASED**  
2009-10-29

E	REVISE GENERAL NOTES: UPDATE TO CURRENT ADD STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A6-3); TOLERANCES (ZN C6-3, D1-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6017-115 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	RF	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	RF	DRAWING NO.	REV. E
MFG. APPR.	RF	D350-748-141	SHEET 1 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	09.09.30	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

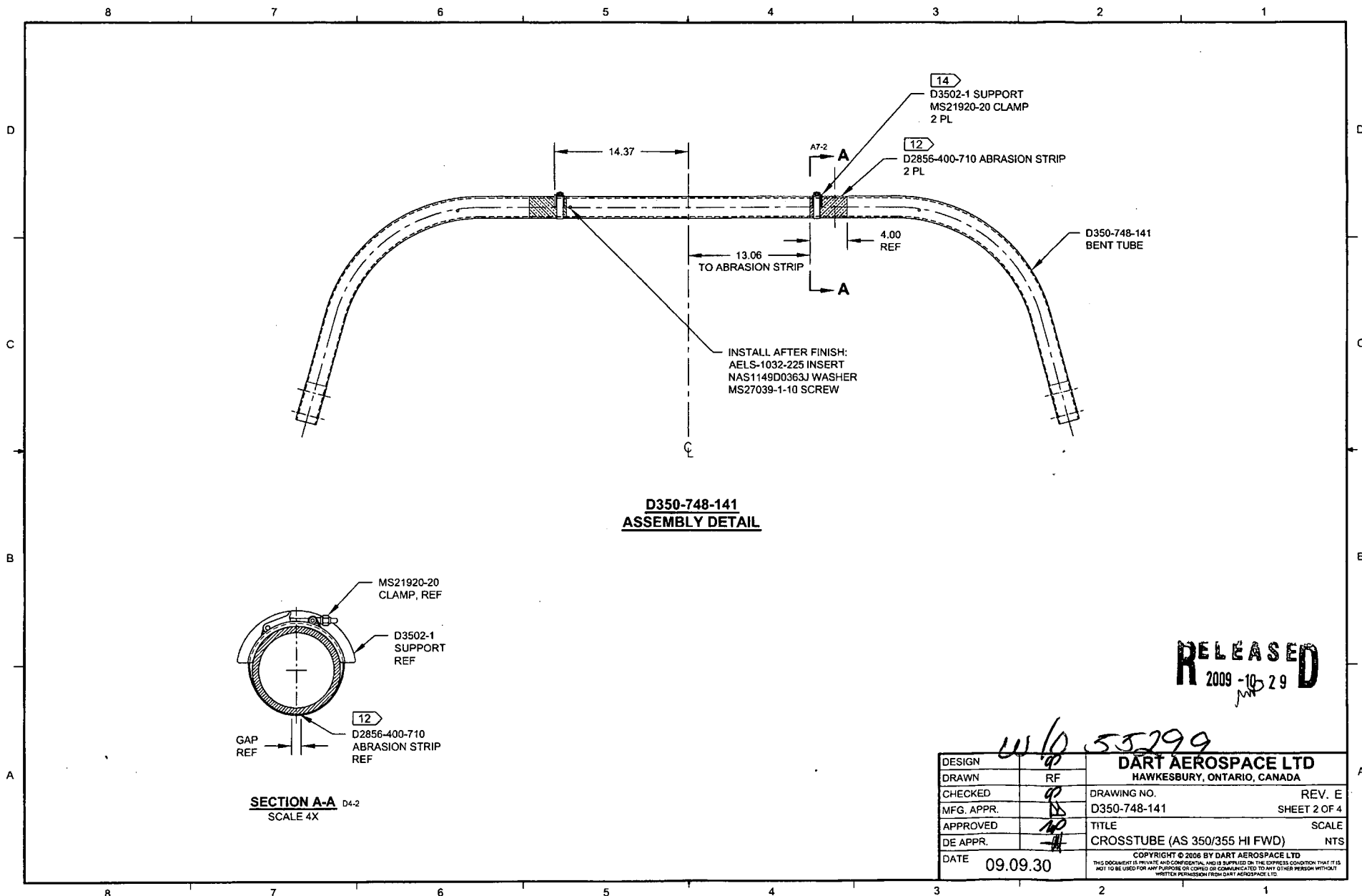
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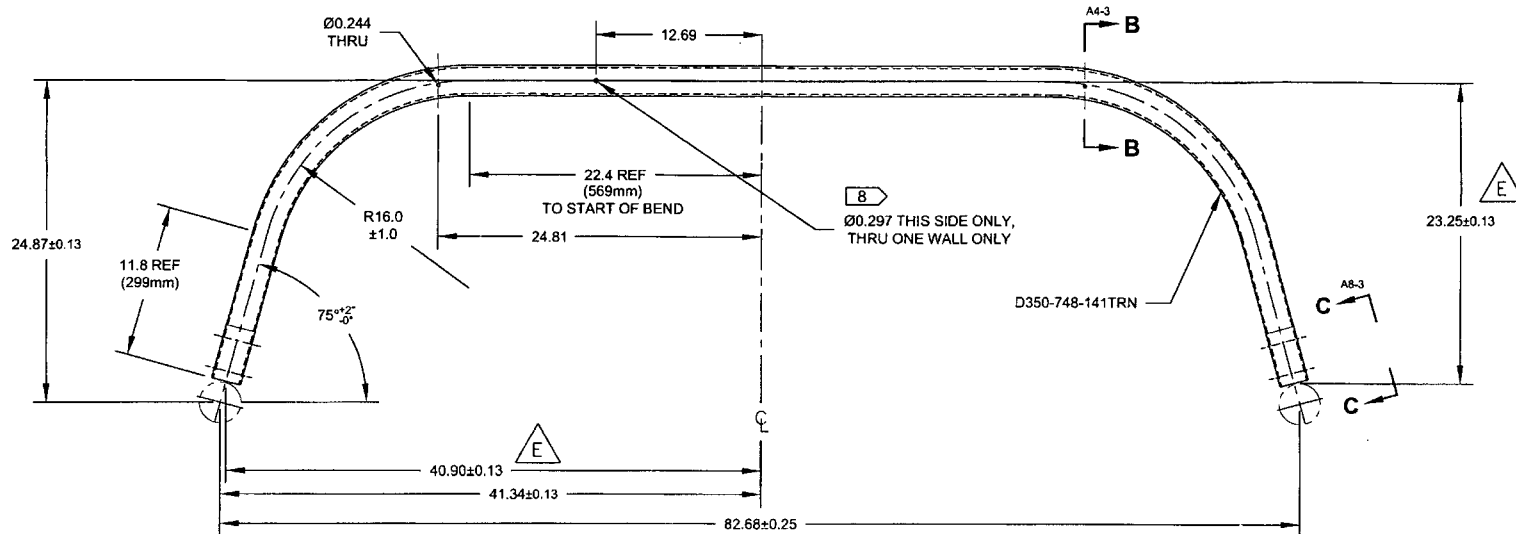
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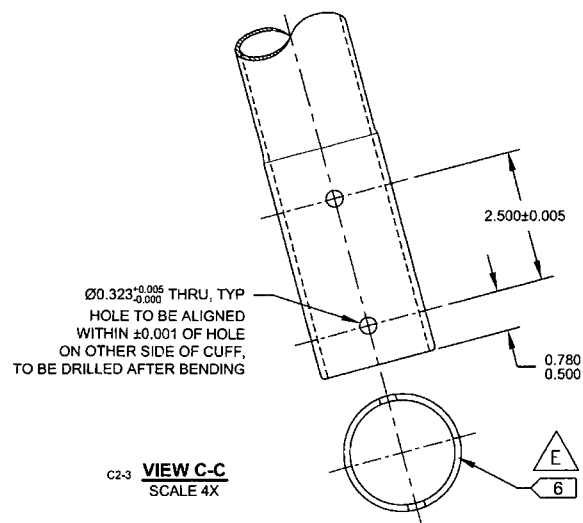
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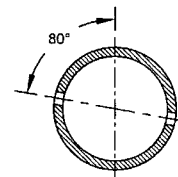




**D350-748-141**  
**BENDING AND DRILLING DETAIL** 10



**VIEW C-C**  
**SCALE 4X**



**SECTION B-B** D3-3  
**SCALE 4X**

**RELEASED**  
2009-10-29

W/O 55299

DESIGN	RF	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	RF	DRAWING NO.	REV. E
MFG. APPR.	RF	D350-748-141	SHEET 3 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (AS 350/355 HI FWD)	NTS
DATE	09.09.30	<small>COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSES OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.</small>	

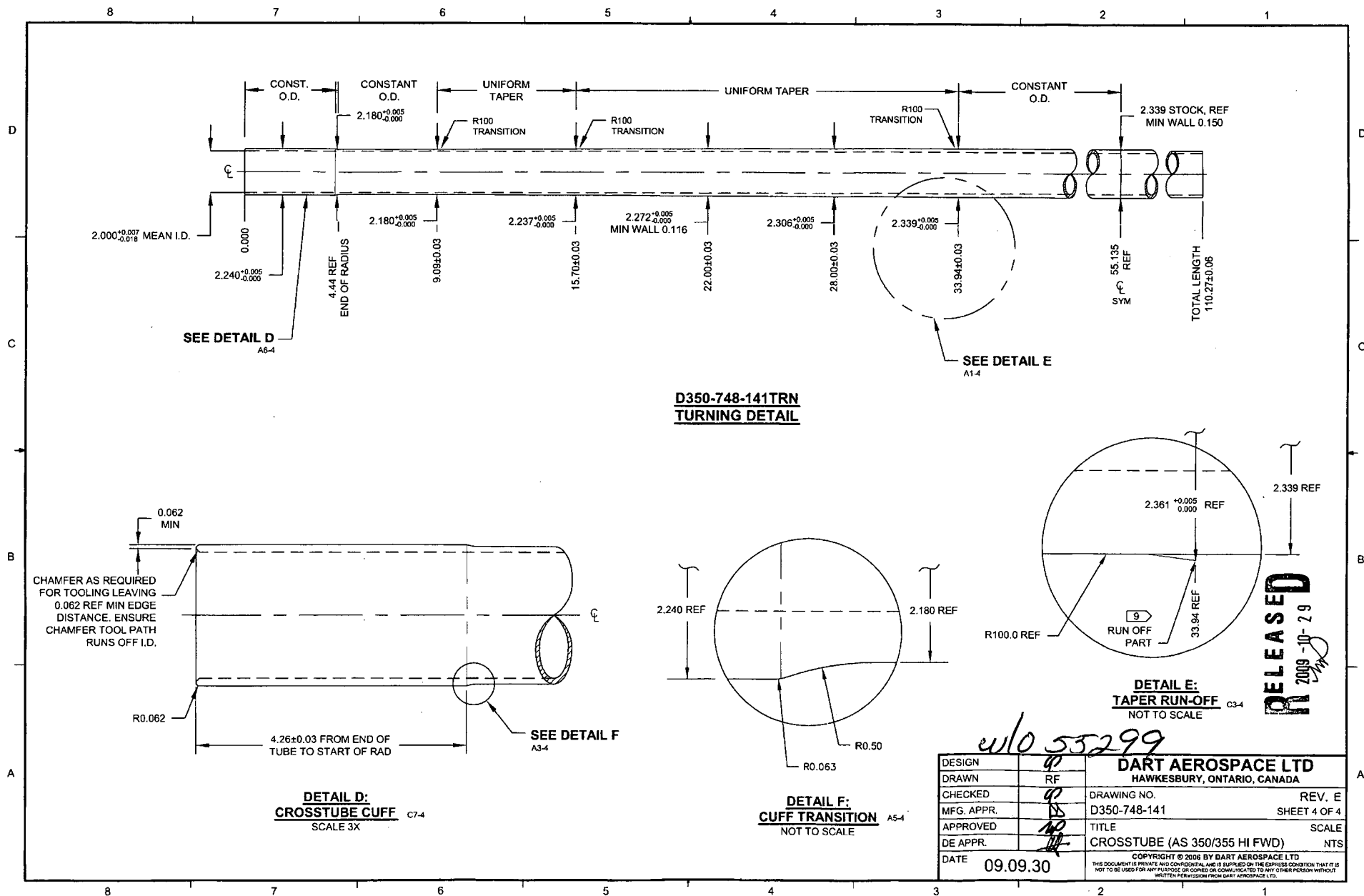
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CHECKED	RF	DRAWING NO.	REV. E
MFG. APPR.	RF	D350-748-141	SHEET 4 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (AS 350/355 HI FWD)	NTS
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 2009-10-29

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VAC AERO  
INTERNATIONAL INC.

RELEASE NOTE

GST No.: R105468102

OAK 119552-1



HEAD OFFICE  
1371 SPEERS ROAD, OAKVILLE, ONTARIO  
CANADA L6L 2X5  
TEL: (905) 827-4171 FAX: (905) 827-7489



2009 WYECROFT ROAD, UNIT B  
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CANADA L6L 6J4  
TEL: (905) 827-7377 FAX: (905) 827-1380



QUEBEC DIVISION  
7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC  
CANADA H4S 1C5  
TEL: (514) 334-4240 FAX: (514) 334-6269

05/19/2010

MM/DD/YYYY

PAGE: 1

1DAR01

BILL TO: DART AEROSPACE LTD.  
1270 ABERDEEN ST.  
HAWKESBURY, ON

SHIP TO: DART AEROSPACE LTD.  
1270 ABERDEEN ST.  
HAWKESBURY, ON

K6A 1K7

K6A 1K7

DATE SHIPPED	SHIP VIA	F.O.B.
05/19/2010		ORIGIN
CUSTOMER P/O No.	JOB No.	TERMS
PO11869		NET 30 DAYS

PART No.	DESCRIPTION	UOM	QTY QRD	QTY SHPD	TEST RESULTS
D350-748	-141 TRN CROSSTUBE	EA	12	12	
<p>Process Specifications: Procedure: 4353 HEAT TREATED TO 180 KSI MIN. PER AMS 2759-1E 100% HARDNESS CHECKED AS PER ASTM E-18 40/45 HRC MATERIAL: 4130 SAND BLASTED AFTER HEAT TREAT</p> <p>55294, 55295, 55296, 55297, 55298, 55299 55300, 55301, 55372, 55373, 55374, 55375</p> <p>6/6/05/07</p> <p>100% HARDNESS TESTED 12 pcs. 42/43 HRC</p> <p>VAL. Q. TH. 25 Q.C.</p>					

I hereby certify that the material covered by this release note has been inspected and tested and conforms to all specifications relevant thereto in accordance with the conditions of the contract / or purchase order.

ON BEHALF OF VAC AERO INTERNATIONAL INC.



*Anna Robinson*  
Authorized Q.C. Inspector



VACUUM BRAZING · HEAT TREATING · SPECIAL PROCESSING · FURNACE EQUIPMENT  
TURBINE COMPONENT OVERHAUL · PLASMA AND OTHER COATINGS